**Introduction to Science: The Scientific Method Guided Notes**

1. What is Science?

* The knowledge obtained by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ natural events and conditions in order to discover \_\_\_\_\_\_\_\_\_\_\_\_\_ and formulate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or principles that can be verified or \_\_\_\_\_\_\_\_\_.

1. What is Physical Science?

* The scientific study of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter.
  + Chemistry
    - The study of all forms of \_\_\_\_\_\_\_\_\_\_, including how matter interacts with other matter.
  + Physics
    - The study of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and how it affects matter.

1. What is the Scientific Method?
   * Step-by Step way in which scientists answer questions.
     1. Ask a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
     2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the topic.
     3. Form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
     4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the Hypothesis
     5. Gather \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
     6. Analyze \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
     7. Draw \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
     8. Communicate \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. State the Problem/Questions
   * Develop a \_\_\_\_\_\_\_\_\_\_\_ statement defining the problem
   * Make sure your problem is narrowed/\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_enough
3. Research
   * Write down all information your already \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   * Do research in books on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_you are investigating.
   * Ask \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the subject your are researching
   * If you find a \_\_\_\_\_\_\_\_\_\_\_\_\_to your problem/question you do not need to move on
4. What is a Hypothesis?
   * An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that is based on prior scientific research or observations and that can be tested.
   * “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Guess”
   * “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” Statement
5. How do you test a Hypothesis? Experiment…
   * Develop a \_\_\_\_\_\_\_\_\_\_\_\_\_ to prove or disprove your Hypothesis
     + Must be run \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_times
     + Must have only 1 independent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (the factor being tested)
     + Must include 2 setups
       - Experimental setup
       - Control setup
6. What are the parts of an experiment?
   * Use a Controlled Experiment
     + An experiment that tests only \_\_\_\_\_\_\_\_\_\_ factor at a time by using a comparison of a control group and an experimental group.
   * Control Group
     + The group that the scientist changes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in.
   * Experimental Group
     + The group that scientist \_\_\_\_\_\_\_\_\_ changed something. It is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the experiment.
7. What is a variable?
   * The factor that is \_\_\_\_\_\_\_\_\_\_ from one group to another.
   * Independent Variable
     + The factor that the scientist \_\_\_\_\_\_\_\_\_\_\_\_ changed in order to test the Hypothesis.
   * Dependent Variable
     + The \_\_\_\_\_\_\_\_\_\_\_\_\_ of what the scientist changed. What happened in the experiment?
8. What are constants?
   * They are what the scientist kept the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in both the control group and the experimental group.
9. How can you gather data?
   * Make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
     + Any use of the senses to gather information.
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Observations
     + Anything that you see, smell, touch, taste, or hear.
     + Ex. Blue, bitter, fizzing sound
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Observations
     + Any observations that can be measured.
     + Must include a number
     + Ex. 5 centimeters long
10. How can you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_results?
    * Record Data
      + Any observations and measurements
      + Be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when you are checking your experiments and recording the results.
      + Create tables or Charts (Data Tables and Pie Charts)
    * Create Graphs for collected Data (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
      + Must \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ all necessary mathematical calculations
11. How can you draw\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?
    * Answer the following question s in paragraph form (Always explain in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ using scientific vocabulary.)
    * Do your results/data support your Hypothesis? Why or why not?
    * What are ways you can improve your data?
    * What would you do differently if you were to repeat the experiment?
12. What is in a conclusion?
    * You ­­­­­­­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of your experiment
    * You indicate what the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_were. Use numbers!!!!! Example: “On average after 3 trials…”
    * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_why those\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ were given. Here you think about what you found out in your \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    * Consider any \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to your procedure. This is error analysis.
    * You ask a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ question – what do you want to do next?
13. How would you communicate results?
    * Share \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with others, such as scientists.
    * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ your findings in a book, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
14. What are scientific models?
    * Model
      + A representation of an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or system/
        - Physical Models
          1. Ex. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        - Mathematical Models
          1. Ex. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        - Conceptual Models
          1. Ex. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
15. What is the difference between a scientific theory and a scientific law?
    * Theory
      + An explanation that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ together many hypotheses and observations.
      + Supported by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ trials.
      + May help with further predictions.
      + Tells \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it happens.
    * Law
      + A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of many experimental results and observations.
      + Tells \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ things work
      + Only tells what happens, it does \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_explain why.